Appendix A

Contractors Material and Test Certificate for Underground Piping

CONTRACTOR'S MATERIAL AND TEST CERTIFICATE FOR UNDERGROUND PIPING

PROCEDURE

Upon completion of work, inspection, and tests shall be made by the contractor's representative and witnessed by an owner's representative. All defects shall be corrected and system left in service before contractor's personnel finally leave the job.

A certificate shall be filled out and signed by both representatives. Copies shall be prepared for approving authorities, owners, and contractor. It is understood the owner's representative's signature in no way prejudices any claim against contractor for faulty material, poor workmanship, or failure to comply with approving authority's requirements or local ordinances.

Property Name		**Date**
Property Address		
PLANS	Accepted by approving authorities (names)	
	Address	
	Installation conforms to accepted plans Equipment used is approved If no, state deviations	• YES • NO • YES • NO
INSTRUCTIONS	Has person in charge of fire equipment been instructed as to location of control valves and care and maintenance of this new equipment? If no, explain	• YES • NO
	Have copies of appropriate instructions and care and maintenance charts been left on premises? If no, explain	• YES • NO
LOCATION	Supplies Buildings	
UNDERGROUND PIPES AND JOINTS	Pipe Types and Class / Type Joint	
	Pipe conforms to _____ Standard Fittings conform to _____ Standard If no, explain	• YES • NO • YES • NO
	Joints needing anchorage clamped, strapped, or blocked in accordance with _____ Standard If no, explain	• YES • NO
TEST DESCRIPTION	Flushing: Flow the required rate until water is clear as indicated by no collection of foreign material in burlap bags at outlets such as hydrants and blow-offs. Flush at flows not less than 390 GPM (1476 L/min) for 4-inch pipe, 880 GPM (3331 L/min) for 6-inch pipe, 1560 (5905 L/min) for 8-inch pipe, 2440 GPM (9235 L/min) for 10-inch pipe, and 3520 GPM (13323 L/min) for 12-inch pipe. When supply cannot produce stipulated flow rates, obtain maximum available and concurrence of the INEEL Fire Marshall. Hydrostatic: Hydrostatic tests shall be made at not less than 200 psi (13.8 bars) for two hours or 50 psi (3.4 bars) above static pressure in excess of 150 psi (10.3 bars) for two hours. Leakage: New pipe laid with rubber gasketed joints shall, if the workmanship is satisfactory, have little or no leakage at the joints. The amount of leakage at the joints shall not exceed 2 qts. Per hr. (1.89 L/h) per 100 joints irrespective of pipe diameter. The leakage shall be distributed over all joints. If such leakage occurs at a few joints the installation shall be considered unsatisfactory and necessary repairs made. The amount of allowable leakage specified above may be increased by 1 fl oz per in. valve diameter per hr. (30 mL/25 mm/h) for each metal seated valve isolating the test section. If dry barrel hydrants are tested with the main valve open, so the hydrants are under pressure, an additional 5 oz per minute (150 mL/min) leakage is permitted for each hydrant.	
FLUSHING TESTS	New underground piping flushed according to approved flushing procedure dated _____ by _____(company) If no, explain	• YES • NO
	How flushing flow was obtained • Public Water • Tank or Reservoir • Fire pump	Through what type opening • Hydrant butt. • Open pipe **Give C factors and pitot readings in comment section.**
	Lead-ins flushed according to approved flushing procedure dated _____ by _____(company) If no, explain	• YES • NO

	How flushing flow was obtained • Public Water • Tank or Reservoir • Fire pump	Through what type opening • Y conn. To flange and spigot • Open pipe

HYDROSTATIC TEST	All new underground piping hydrostatically tested at psi for hours	Joints covered • YES • NO
LEAKAGE TEST	Total amount of leakage measured gals hours	
	Allowable leakage gals hours	
HYDRANTS	Number installed / Type and Make	All operate satisfactorily • YES • NO
CONTROL VALVES	Water control valves left wide open If no, state reason	• YES • NO
	Hose threads of fire department connections and hydrants interchangeable with those of fire department answering alarm.	• YES • NO
REMARKS	Date left in service	
SIGNATURES	Name of installing Contractor	
	Tests Witnessed By	
	For Operating Contractor Title Date	
	For Installing Contractor Title Date	

Additional Explanation and Notes

SECTION 13910--WET PIPE FIRE PROTECTION SYSTEM

PART 1--GENERAL

SUMMARY:

Section Includes: Work includes, but is not limited to:

Layout, fabricate, install, flush and test fire protection systems including pipe, fittings, sprinkler heads, hangers, supports, earthquake bracing, expansion joints, and all necessary accessories and components to assure complete and operable wet pipe automatic sprinkler systems for buildings as indicated on the attached drawings.

RELATED SECTIONS:

Section 01300 Submittals
Section 09900 Painting
Section 13120 Pre-Engineered Metal Building
Section 13505 Underground Fire Water Distribution System

REFERENCES:

The following documents, including others referenced therein, form part of this Section to the extent designated herein.

INTERNATIONAL CONFERENCE OF BUILDNG OFFICIALS (ICBO)

UBC	Uniform Building Code

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 13	Standard for the Installation of Sprinkler Systems

FACTORY MUTUAL (FM)

FM Approval Guide	Fire Protection
FM Data Sheet 2-8	Earthquake Protection for Sprinkler Systems
FM Data Sheet 2-8N	Installation of Sprinkler Systems

SYSTEM DESCRIPTION:

Project Drawings: The project drawings do not attempt to show complete details of the building construction that affect the fire protection installation. The drawings in part are diagrammatic and do not show all offsets, fittings, valves, equipment, etc. It is absolutely essential to study the architectural, structural, mechanical, and electrical drawings and confer

with the various trades involved. To assure that there is no conflict between the fire protection system and the work of other trades and to assure that the owner secures the best arrangement of work consistent with the use of space.

Layout Requirements: This specification and the Regulatory Requirements outlined in Quality Control shall govern this design.

This facility will consist of four (4) separate buildings requiring various design areas for associated occupancies.

Administrative Office Building and office storage areas shall have wet pipe automatic sprinklers installed throughout the areas both above and below the suspended ceiling. The sprinkler system shall be laid out to protect an ordinary hazard group I occupancy using NFPA 13 and FM Data Sheet(s) 2-8 and 2-8N. The system shall be designed to provide a minimum sprinkler density of 0.15 gpm/sq. ft over the most hydraulically remote 1500 sq. ft. or the entire area, which ever is smaller.

The other 3 buildings will have dry pipe sprinkler systems installed. **See Section 13935 for Dry Pipe Fire Sprinkler System Construction Specifications and Section 13914 for Water Spray Fire Extinguishing System Construction.**

The sprinkler system for these areas shall be designed with an additional 500 gpm outside hose stream allowance.

The water supply pressure and flow information available for use in the hydraulic calculations shall be obtained by a test taken as near possible to the two connections for the new underground fire loop as depicted on the drawings.

The maximum water velocity through the overhead sprinkler system shall not exceed 25 ft per second. The exception is for 2 in. and smaller line piping in a gridded system where the velocity shall not exceed 20 ft per second. The final hydraulic design requirements shall result in a water supply demand that is a minimum of 10% below the water supply curve.

Piping: All above ground piping used in this project for wet pipe systems shall conform to the Product section of this section. All exposed piping shall be painted and labeled all other piping shall be labeled as a minimum. Piping leading from the fire department pumper connection to the first check valve, piping leading from the connection to the underground main, to the backflow preventer, and all other piping, which is open to the atmosphere shall be galvanized piping.

Obstructions: Sprinkler heads shall be installed under all obstructions to include ducts, lights, equipment, cable trays, racks of piping, or any combination of equipment per the requirements for obstructions.

Seismic Bracing: Earthquake sway bracing shall be provided based upon **FM 2-8 using a "G" factor of 0.5**. Calculations, using the zone of influence method, showing the forces on the attachments shall be done to verify that the minimum requirements outlined are not exceeding the allowable strengths of listed equipment or allowable strength of the building structure at the point of attachment. Details of the sway bracing shall be provided on the shop drawings and bracing calculation sheets.

The subcontractor shall be responsible for coordinating with the building manufacture to assure the structure is capable of supporting both the static and dynamic loads imposed by the automatic sprinkler system layout. The forces developed at the point of connection to the structure must be taken into account and approved by the building structural designer.

Piping installed such that it is supported by laying directly on the building structural members or trapeze shall be secured in place to resist vertical moment as if it were hanging from the same members or trapeze. Exceptions will be allowed on a case by case basis with the concurrence of the Facility Fire Protection Engineer.

Concrete Block Anchors: Anchors for attaching to the building concrete block walls shall be installed in the grout filled blocks to the maximum extent possible. Where this is not possible, connection to the hollow block will be acceptable if the anchor used is rate for this type of installation. Regardless of the method used the loads on the anchor shall not exceed the allowable load for the anchor.

Hangers: Design shall be designed for pressures in excess of 100 psi. Hangers attaching to steel purlins shall be attached by connecting into the web of the purlin using side beam brackets.

Flushing Connections: Flushing connections shall be provided as required.

Sleeves and Penetrations: All pipes penetrating concrete or masonry walls or floors shall be sleeved. Sleeves shall be caulked to retain the proper fire wall rating and to prevent water entry from outside the building or between floors with an approved sealant. Sleeves shall extend 1 in. above the finished floor.

Sprinklers: Sprinklers shall be high temperature, ½", upright or pendent, throughout the buildings, with the exception of door vestibules and the office areas. The door vestibule areas shall use ½", ordinary temperature, dry pendent or dry sidewall heads. The office areas shall use ½", pendent, ordinary temperature heads below the suspended ceiling and high temperature pendent or upright, heads above the suspended ceiling.

Estucheons: Two piece estucheons shall be provided on all pendent sprinklers located beneath an intermediate ceiling.

Spare sprinkler heads shall be provided in accordance with NFPA 13. A wall mounted metal cabinet adjacent to the riser shall be provide to contain the sprinkler heads along with a wrench for each type of sprinkler head. The cabinet shall have a hinged cover.

Sprinkler Spacing: Sprinklers spacing shall be based upon the hazard protected, but in no case than required for Ordinary Hazard Group I.

Head Guards: Guards shall be placed around all heads which are subject to mechanical damage.

Control Valves: All valves controlling fire protection water supplies shall be provided with valve supervision capabilities.

Inspector Test Connections: Inspector test connections shall use a ¼ turn ball valve. Test connection valve shall be located at the hydraulically remote end of the system, approximately 6 ft maximum above finished floor. It shall drain to the exterior of the building.

Cathodic Protection: An isolation flange gasket shall be installed between the underground and above ground piping.

Splash Blocks: The Subcontractor shall furnish splash blocks at the main drain, inspector's test connection, and all other exterior discharge locations that do not drain onto asphalt or concrete.

SUBMITTALS:

Vendor Data requirements for this section are summarized on the Vendor Data Schedule.

Layout: The fire water supply system layout shall be submitted as a complete package for review. Complete packages shall include thrust block calculations, thrust block details, sway bracing calculations, sway bracing details, hydraulic calculations, and piping method including make and model of all equipment used. Partial submittals will be considered as incomplete and will not be reviewed. The layout must receive an "A" or "B" designation by the Contractor prior to beginning of installation and shall comply with NFPA 13, FM 2-8N, and FM Approval Guide requirements.

The Subcontractor shall submit all layout drawings for approval prior to construction. All drawings shall be completed on size D (22" X 34") CAD generated drawings. Lettering size shall be a minimum of 1/8 (.125)" inch for all lettering on the main body of the drawing. Border and title block shall follow format in this drawing package. Drawings shall be done using AutoCAD or a similar program, which generates dwg files, which are compatible with AutoCAD 2000 and use a **simplex font**. An electronic copy of the As-Built configuration shall be furnished in addition to the original drawing plots.

An electronic copy of border and title block format, as well as the associated drawings are available upon request. An A/E Drawing Standard format is available upon request.

Calculations: A copy of the calculations used in sizing the sway bracing shall be provided for review prior to final acceptance of the installation. Use form, Figure A-6-4.5(a), as shown in NFPA 13, 1999 edition or approved equal. Electronic copies of input data, compatible with HASS 7.1, used in hydraulic calculations shall be submitted.

Drawings: The Subcontractor shall submit layout drawings for review and authorization to proceed prior to construction. Drawings shall conform the requirements of the Section 01300, Submittals.

As-built drawings in both electronic format and hard copy shall be submitted.

Quality Control Submittals:

Procedures: The Subcontractor shall submit a hydrostatic test procedure and a detailed, job specific flushing procedure. The flushing procedure shall outline where the flushing water will be obtained and how it will be disposed of in a safe manner. It shall also outline how the flow will be monitored to assure adequate flow and how long the flow must be maintained to adequately flush the piping. This procedure must be submitted for review prior to any connections to existing plant piping.

Certifications: A Contractor's Material and Test Certification for Above-Ground Piping shall be completed and accepted, for each major portion of the work covered by this specification prior to final acceptance of the installation.

Test Reports: A final inspection form shall be submitted for the automatic sprinkler system installed or modified by this project. See Attachment 2 of this section for acceptance forms to be submitted.

Building Manufacture Letter: A letter from the steel building manufacture approving the method, location, and forces used in the attachment of earthquake sway bracing.

See Section 01300, Submittals and the Vendor Data Schedule for additional submittal requirements.

QUALITY CONTROL:

Qualifications: The Subcontractor for the fire sprinkler system shall have a NICET Certified Engineering Technician (CET) in Fire Protection with a minimum Level III rating or a Professional Engineer (PE) in Fire Protection responsible for overseeing the preparation of the layout drawings and installation. This person shall be required to certify that the drawings are in accordance with this specification and all the regulatory requirements. All drawings shall be signed by the CET or stamped and signed by the PE.

Manufacturers: Firms regularly engaged in the manufacture of fire sprinklers and piping accessories of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

Installer: A firm with at least 3 years of successful installation experience on projects with fire sprinkler piping similar to that required for this project. The installing Subcontractor shall be licensed, by the State of Idaho, as a Fire Protection Sprinkler Subcontractor.

Materials: Provide sprinklers, piping, fittings, and devices with a UL listing and FM approval unless a specified product is only covered by one of the agencies. Exceptions will be made on a case by case basis for the products submitted as or equals. If no product exists that has both a UL listing and FM approval, it will be acceptable to use a product that has been published in either organization's publications.

Regulatory Requirements (Codes and Standards): Comply with the provisions of the following codes and standards unless otherwise specified herein.

NFPA 13
FM Data Sheet 2-8
FM Data Sheet 2-8N

DELIVERY, STORAGE AND HANDLING:

All materials shall be delivered to and stored at the job site in a manner which will prevent foreign material from getting inside the piping and valving.

SEQUENCING /SCHEDULING:

The static and dynamic loads associated with the fire protection system must be coordinated with the building structural design.

The underground fire water main must be flushed and accepted prior to connection to the sprinkler system riser.

PART 2--PRODUCTS

MATERIALS AND EQUIPMENT:

Sprinkler Piping: Piping shall be welded or seamless carbon steel, Schedule 40, conforming to the requirements of ASTM A53 or A795. Schedule 10 UL listed or FM approved, or ASTM A-795 approved for 2 1/2 in. and larger pipe is acceptable in office occupancies. Branch lines shall be Schedule 40 only.

Galvanized steel piping shall be welded or seamless, Schedule 40, conforming to the requirements of ASTM A-53 or A795. Schedule 10 UL listed or FM approved, or ASTM A-795 approved for 2 1/2 in. and larger pipe is acceptable in office occupancies.

Pipe Fittings: Reduction in pipe size shall be made with one-piece reducing fittings. Bushings will not be acceptable. Plain-end fittings are not acceptable.

Welded fittings on galvanized piping will not be allowed, unless the weld affected zone of the fitting and associated piping is hot dip galvanized.

Reduction in pipe size shall be made with one-piece reducing fittings. Bushings are not acceptable. Screwed fittings shall utilize TEFLON tape and/or TEFLON paste to prevent galling.

Pipe Couplings: Couplings shall be threaded malleable iron, conforming to ASME B 16.9, or grooved.

Flexible grooved couplings in pipelines shall be Victaulic Style 75, 77 or approved equal.

Rigid grooved couplings in pipelines shall Victaulic styles 005 or 07, threaded, or approved equal.

The grooving machine, used to prepare the piping, shall be approved for use with the coupling by the coupling manufacturer.

Plain end and welded couplings shall no be allowed.

Sprinkler Heads: All heads shall be listed and approved for use in the occupancies described above.

Standard sprinklers shall be ½" inch, glass bulb, pendent or upright. Central Model GB or approved equal.

Dry type heads shall be standard response, ½", glass bulb, pendent or sidewall. Central Model Glass Bulb Dry Pendent or Sidewall, or approved equal.

Stainless steel heads shall be Central Model A-2 or approved equal.

Sprinkler Guards: Guards shall be of the type which can be installed after the sprinkler head is installed. Guards shall be Gem Model F774 or equal.

Propylene Glycol: Anti-freeze solution consisting of 40% water and 60% food grade propylene glycol.

Fire Department Connections: Fire department connections shall be of the siamese type, 2-1/2 in. female swivel connections with National Standard fire hose threads. The fire departments connections shall be Potter-Roemer Model 5710 or approved equal. Two 2-1/2 in. plugs shall be included and shall be Potter-Roemer Model 5950 or approved equal. An identification plate labeled AUTOSPKR shall be provided.

Alarm Check Valve: The alarm check valve shall be complete with trim including a retard chamber. The valve shall be Central Model F or Model G or approved equal.

Control Valve:

Butterfly Valve: A butterfly valve with weather proof actuator housing, shall have a positive indication for the open and closed position, and be pre-wired for valve supervision. It shall be Victaulic Series 708-W or approved equal.

Outside Screw and Yoke (OS&Y): Valves shall be UL listed and FM approved. American Flow Control, Series 500 or approved equal.

Electric Bell: The electric bell shall be Potter PBD Series or approved equal with BBK-1 Weatherproof back box.

Check Valves:

In line check valves shall be equipped with a removable face for easy inspection and maintenance. Central Figure 590F or Central Model 90, if used for backflow preventer testing, or approved equal.

Water Flow Pressure Alarm Switch: Pressure type water flow alarm switch with built in recycling pneumatic retard and two sets of SPDT contacts shall be provided as part of the Alarm Valve trim. Potter PS10-2 Pressure Type Flow Switch or approved equal.

Valve Supervision: Supervision shall be provided on the valves using a Potter Model OSYSU switch or approved equal. The switch shall be waterproof and have two sets of Form C snap action contacts.

Hangers:

Threaded side beam brackets, TOLCO Fig. 58 or approved equal with bolt and hex nut fastener.

C-Type beam clamps with retaining strap, TOLCO Fig. 65, 66, or approved equal. Retaining strap TOLCO Fig. 69 or approved equal.
Ring Hanger, TOLCO Fig. 2, 2NFPA, and 200 or approved equal.

Surge Restrainer: TOLCO Fig. 25 or approved equal.

Straps: Straps shall be UL Listed and FM approved, ¼" bolt holes, Carbon Steel. Grinnell Short Strap, Fig. 262 or approved equal.

Concrete Anchors: Anchors shall be Factory Mutual Approved for use in Pre-Cast Hollow Core, Post Tensioned, and Poured Concrete. Hilti Model HDI-P or approved equal.

Concrete Block Anchors:

Grout-filled: Anchors shall be a rated for ASTM C90, concrete block, filled with 2000 psi grout conforming to ASTM C474. Hilti model HIT HY 150 Injection Adhesive Anchor or HVA Adhesive System.

Hollow Block: Anchors shall be approved for use in ASTM C90, type II, hollow concrete block. Hilti model Sleeve Anchor or approved equal.

Pipe Stands: Pipe stands shall be adjustable and have a pipe saddle. Tolco Fig. 319 with Fig. 317 saddle.

Earthquake and Sway Bracing: Sway bracing shall be UL listed or designed by a registered Professional Engineer in the State of Idaho.

Inspector Test Valve: Test valve shall be a ¼ turn ball valve. Victaulic Series 722 or approved equal.

Signs: All drain and test valves shall have identification signs per NFPA 13. Lettering shall be a minimum of 2 in. high white letters on red background.

Hydraulic data placards shall be metal and permanently embossed with the information required by NFPA 13. The Subcontractor shall supply, fill in all the required information, and install the placards on the system riser.

Splash Block: Splash blocks shall be concrete.

Flange Isolation Kit : Electrical isolating flange gasket kits shall be for broad service conditions. The kit shall be manufactured from field proven materials having a minimum dielectric strength of 500 Volts/mil. The kit come standard type with full face, type E gasket, one piece insulating sleeve and associated gasket, and detailed installation instructions.

FINISHES:

See Section 09900 Painting, for the requirements of painting and labeling all pipe, fittings, hangers, and devices. Exposed carbon steel pipe, fittings, hangers and devices shall be painted red and labels installed. Galvanized or stainless steel pipe need not be painted but shall be labeled.

PART 3--EXECUTION

INSTALLATION:

Only new and approved sprinklers, piping, fittings, hangers and devices shall be employed in the installation of the sprinkler system.

Isolating Gasket Installation Procedures

Inspect and clean all flange surfaces prior to installing the gasket.

Align the bolt holes of the flanges so as to eliminate the possibility of damage to the sleeves during installation by pinching the thread form through the sleeve.

With one nut installed onto one end of each stud and with the thread and nut face surface lubricated with a suitable non-electrical conducting thread lubricant, install one steel washer, one plastic washer and a plastic sleeve over the stud and in that order. DO NOT PLACE THE PLASTIC WASHER AGAINST THE NUT.

For full face style gaskets, center the gasket between the flanges aligning the bolt holes of the gasket to the bolt holes of the flanges and insert all of the threaded assemblies into all of the bolt holes. Install plastic washers, steel washers and nuts so as to complete the assembly.

With a wrench begin to close the flanges together evenly against the surfaces of the gasket. You will feel a mild resistance to closure as you begin to compress the Teflon seal and a sudden rise in resistance when closure is complete.

Torque the studs to the specified Bolt Torque Value listed in Technical Support using a criss-crossing pattern in increments to attain a uniform face loading on the gasket.

FIELD QUALITY CONTROL:

One set of approved fire protection design drawings shall be maintained on the project site during construction. The Subcontractor shall redline all changes daily. The redline drawings shall be incorporated on the "as-built" design drawings by the Subcontractor.

Subcontractor Supplied Tests:

Test of Wet Pipe Sprinkler System: All new fire system piping shall be hydrostatically tested at (for INTEC) not less than 225 psi pressure or 50 psi above the maximum operating pressure for two (2) hours with no visible leakage. All leaks shall be repaired and system retested.

Test of Existing Wet Pipe Sprinkler System: Existing fire sprinkler systems requiring minor modifications shall be tested at the normal system working pressure for not less than twenty four (24) hours and inspected with no visible leakage. Any leaks detected shall be repaired and re-tested.

Isolating Gasket Testing Procedures:

Use a continuity tester to check the studs for shorting through the sleeve material. If a stud conducts then remove the stud and check the sleeve for pinch through. Repair and retest.

Final Inspection: The sprinkler Subcontractor CET or PE responsible for overseeing this project shall make a complete and final inspection of the installation, checking out all alarms, valves, piping, seismic bracing, hangers, etc. and conduct a final main drain test on the system.

Contractor Inspection: The Contractor's Representative shall witness all hydrostatic pipe testing. Surveillance will be performed by the Contractor's Representative to verify compliance of the work to the drawings and specifications.

CLEANING:

Flushing of Piping: New underground mains and lead-in connections to system risers shall be flushed thoroughly immediately after tie-in to system is made or before connection is made to the sprinkler piping.

Sprinkler Pipe Flushing Procedure: Upon completion of installation, the system shall be filled and drained at least two (2) times. Water shall be run through the inspectors test connection or auxiliary drain until water flows clear.

END OF SECTION 13910

Attachment 1

Contractor's Material & Test Certificate

CONTRACTOR'S MATERIAL AND TEST CERTIFICATE FOR ABOVEGROUND PIPING

PROCEDURE

Upon completion of work, inspection and tests shall be made by the contractor's representative and witnessed by an owner's representative. All defects shall be corrected and system left in service before contractor's personnel finally leave the job.

ate shall be filled out and signed by both representatives. Copies shall be prepared for approving authorities, owners, and contractor. It is understood t r's representative's signature in no way prejudices any claim against contractor for faulty material, poor workmanship, or failure to comply with approving authority's requirements or local ordinances.

Property Name	**Date**

Property Address

PLANS	Accepted by approving authorities (names)	
	Address	
	Installation conforms to accepted plans Equipment used is approved. If no, explain deviation	Γ YES Γ NO Γ YES Γ NO
INSTRUCTIONS	Has person in charge of fire equipment been instructed as to location of control valves and care and maintenance of this new equipment? If no, explain	Γ YES Γ NO
	Have copies of the following been left on the premises: 1. System Components Instructions 2. Care and Maintenance Instructions 3. NFPA 25	 Γ YES Γ NO Γ YES Γ NO Γ YES Γ NO
LOCATION OF SYSTEM	Supplies Buildings	

SPRINKLERS

Make	Model	Year of Manufacture	Orifice Size	Quantity	Temperature Rating

PIPE AND FITTINGS

Type of Pipe
Type of Fittings

ALARM VALVE OR FLOW INDICATOR

Alarm Device			Maximum Time to Operate Through Test Connection	
Type	Make	Model	Minutes	Seconds

DRY PIPE OPERATING TEST

Dry Valve			Q.O.D.		
Make	Model	Serial No.	Make	Model	Serial No.

	Time to Trip Thru Test Connection*		Water Pressure	Air Pressure	Trip Point Air Pressure	Time Water Reached Test Outlet*		Alarm Operated Properly	
	Min	Sec	psi	psi	psi	Min	Sec	Yes	No
Without Q.O.D.									
With Q.O.D.									

If no, explain

DELUGE & PREACTION VALVES

Operation Γ Pneumatic Γ Electric Γ Hydraulic

Piping Supervised Γ YES Γ NO | Detecting media supervised Γ YES Γ NO

Does valve operate from the manual trip and/or remote control stations Γ YES Γ NO

*Measured from thime inspector's test connection is opened.

	Is there an accessible facility in each circuit for testing Γ YES Γ NO				If no, explain			
DELUGE & PREACTION) VALVES (continued	Make	Model	Does Each Circuit Operate Supervision Loss Alarm		Does Each Circuit Operate Valve Release		Maximum Time to Operate Release	
			Yes	No	Yes	No	Min	Sec
PRESSURE REDUCING VALVE TEST	Location & Floor	Make & Model	Setting	Static Pressure		Residual Pressure (Flowing)		
				Inlet (PSI)	Outlet (PSI)	Inlet (PSI)	Outlet (PSI)	Flow (GPM)
TEST DESCRIPTION	Hydrostatic: Hydrostatic test shall be made at not less than 200 psi (13.6 bars) for two hours or 50 psi (3.4 bars) above static pressure in excess of 150 psi (10.2 bars) for two hours. Differential dry-pipe valve clappers shall be left open during test to prevent damage. All aboveground piping leakage shall be stopped.							
	Pneumatic: Establish 40 psi (2.7 bars) air pressure and measure drop which shall not exceed 1-1/2 psi (0.1 bars) in 24 hours. Test pressure tanks at normal water level and air pressure and measure air pressure drop which shall not exceed 1-½ psi (0.1 bars) in 24 hours.							
TESTS	All piping hydrostatically tested at ___ psi for ___ hrs. Dry piping pneumatically tested Γ YES Γ NO Equipment operates properly Γ YES Γ NO				If no, state reason			
	Do you certify as the Sprinkler Contractor that additives and corrosive chemicals, sodium silicate or derivatives of sodium silicate, brine, or other corrosive chemicals were not used for testing systems or stopping leaks? Γ YES Γ NO							
	Drain Test	Reading of gage located near water supply test connection: ___ psi			Residual pressure with valve in test connection open wide ___ psi.			
	Underground mains and lead in connections to system risers flushed before connection made to sprinkler piping. Verified by copy of the U Form No. 85B Γ YES Γ NO Other Explain Flushed by installer of underground sprinkler piping Γ YES Γ NO							
	If powder driven fasteners are used in concrete, has representative sample testing been satisfactorily completed Γ YES Γ NO						If no, explain	
LANK TESTING GASKETS	Number Used			Locations			Number Removed	
WELDING	Welded Piping Γ YES Γ NO If Yes...							
	Do you certify as the Sprinkler Contractor that welding procedures comply with the requirements of at least AWS D10.9, Level AR-3						Γ YES	Γ NO
	Do you certify that the welding as performed by welders qualified in compliance with the requirements of at least AWS D10.9, Level AR-3						Γ YES	Γ NO
	Do you certify that welding was carried out in compliance with a documented quality control procedure to ensure that all discs are retrieved, that openings in piping are smooth, that slag and other welding residue are removed, and that the internal diameters of piping are not penetrated						Γ YES	
CUTOUTS (DISCS)	Do you certify that you have a control feature to ensure that all cutouts (discs) are retrieved? Γ YES Γ NO							
HYDRAULIC DATA NAMEPLATE	Name Plate Provided Γ YES Γ NO				If no, explain			
REMARKS	Date left in service with all control valves open:							
SIGNATURES	Name of Sprinkler contractor							
	Tests Witnessed By							
	For Property Owner (Signed)		Title		Date			
	For Sprinkler Contractor (Signed)		Title		Date			

Additional Explanation and Notes

Attachment 2

FINAL INSPECTION FORM

INEEL FIRE PROTECTION INSTALLATION FINAL INSPECTION FORM	
Sprinkler Contractor name and address	
Facility Inspected Building/System No./ Control Valve No.	
Inspection by: Name address phone	 PE or CET No

I have personally inspected the automatic sprinkler system referenced above and found it to be installed in accordance with the approved working drawings and associated review comments. The attached As-Built drawings and hydraulic calculations reflect the installation as it presently exists.

The following is the results of the main drain test conducted during my inspection:

Static Pressure: _____ Psig
Residual Pressure: _____ Psig

I certify that all areas of the building covered by the above referenced system have been protected in accordance with NFPA, Factory Mutual, and the project specifications, and all signs and placards have been installed.

_____ Date:
(Signed by PE or CET)

Comments or Exceptions:

SECTION 13911--DRY PIPE FIRE PROTECTION SYSTEM

PART 1--GENERAL

WORK INCLUDED: Work includes, but is not limited to:

Layout, fabricate, install, flush, and test fire protection systems including pipe, fittings, sprinkler heads, hangers, supports, earthquake bracing, expansion joints, and all necessary accessories and components to assure complete and operable dry pipe automatic sprinkler systems.

RELATED SECTIONS:

Section 01300 Submittals
Section 09900 Painting
Section 13120 Pre-Engineered Metal Building
Section 13505 Underground Fire Water Distribution System
Section 13914 Water Spray Deluge Fire Extinguishing System

REFERENCES:

The following documents, including others referenced therein, form part of this Section to the extent designated herein.

INTERNATIONAL CONFERENCE OF BUILDING OFFICIALS (ICBO)

UBC	Uniform Building Code

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 13	Standard for the Installation of Sprinkler Systems

FACTORY MUTUAL (FM)

FM Approval Guide	Fire Protection
FM Data Sheet 2-8	Earthquake Protection for Sprinkler Systems
FM Data Sheet 2-8N	Installation of Sprinkler Systems

SYSTEM DESCRIPTION:

Reference Drawings: The reference drawings do not attempt to show complete details of the building construction which affect the fire protection installation. The drawings in part are diagrammatic and do not show all offsets, fittings, valves, equipment, etc. It is absolutely essential to study the architectural, structural, mechanical, and electrical drawings and confer with the various trades involved. To assure that there is no conflict between the fire

protection system and the work of other trades and to assure that the owner secures the best arrangement of work consistent with the use of space.

Layout Requirements: This specification and the Regulatory Requirements outlined in Quality Control shall govern this layout.

The facility will consist of three (3) separate buildings that require dry pipe sprinkler systems for various associated occupancies as follows:

Receiving, Shipping and Staging Areas along with mechanical equipment and equipment support areas shall have dry pipe automatic sprinklers installed throughout the areas. Storage is expected to be_____ commodities stored in a ____ configuration. The sprinkler system shall be designed to protect _____ commodities stored to _____height using FM Data Sheet 8-9. The sprinkler system shall be laid out to meet NFPA 13 and FM Data Sheet(s) 2-8 and 2-8N. The system shall be hydraulically designed to provide a minimum sprinkler density of _____gpm/sq. ft over the most hydraulically remote _____ sq. ft. or entire area, which ever is smaller.

Storage Warehouse Area shall have dry pipe automatic sprinklers installed throughout the area. Storage is expected to be_____ commodities stored in a ____ configuration. The sprinkler system shall be designed to protect _____ commodities stored to _____height using FM Data Sheet 8-9. The sprinkler system shall be laid out to meet NFPA 13 and FM Data Sheet(s) 2-8 and 2-8N. The system shall be hydraulically designed to provided a minimum sprinkler density of _____gpm/sq. ft over the most hydraulically remote _____ sq. ft. or entire area, which ever is smaller

Treatment Areas shall have wet pipe automatic sprinklers installed throughout the area. The sprinkler system shall be hydraulically designed and laid out to protect _____ commodities stored to _____height using FM Data Sheet 8-9. The sprinkler system shall be laid out to meet NFPA 13 and FM Data Sheet(s) 2-8 and 2-8N. The system shall be hydraulically designed to provide a minimum sprinkler density of _____gpm/sq. ft over the most hydraulically remote _____ sq. ft. or entire area, which ever is smaller.

The other building will have dry pipe sprinkler systems installed. **See Section 13910 for Wet Pipe Fire Sprinkler System Construction Specifications and Section 13914 for Water Spray Fire Extinguishing System Construction.**

The water supply pressure and flow information available for use in the hydraulic calculations shall be obtained by a test taken as near possible to the two connections for the new underground fire loop as depicted on the drawings.

The maximum water velocity through the overhead sprinkler system shall not exceed 25 ft per second. The exception is for 2 in. and smaller line piping in a gridded system where the velocity shall not exceed 20 ft per second. The final hydraulic design requirements shall

result in a water supply demand that is a minimum of 10% below the water supply curve.

Piping: All above ground piping used in this project for wet pipe systems shall conform to the Product section of this section. All exposed piping shall be labeled all other piping shall be labeled as a minimum. Piping leading from the fire department pumper connection to the first check valve, piping leading from the connection to the underground main, to the backflow preventer, and all other piping, which is open to the atmosphere shall be galvanized piping.

Air supply: The dry pipe valve and associated air maintenance device shall be arranged to avoid tripping due to water pressures of 160 psig. The air supply for this installation shall be obtained from a _____ mounted tank air compressor. The air compressor shall be provided with an air dryer and filter assembly. The system shall be sized based upon a dry pipe sprinkler system sized at _____ gallons as a minimum. A by-pass around the air compressor shall be provided, to allow for the use of plant air, as a means of filling the system.

Obstructions: Sprinkler heads shall be installed under all obstructions to include ducts, lights, equipment, cable trays, racks of piping, or any combination of equipment per the requirements for obstructions.

Seismic Bracing: Earthquake sway bracing shall be provided based upon **FM 2-8 using a "G" factor of 0.5**. Calculations, using the zone of influence method, showing the forces on the attachments shall be done to verify that the minimum requirements outlined are not exceeding the allowable strengths of listed equipment or allowable strength of the building structure at the point of attachment. Details of the sway bracing shall be provided on the shop drawings and bracing calculation sheets.
The subcontractor shall be responsible for coordinating with the building manufacture to assure the structure is capable of supporting both the static and dynamic loads imposed by the automatic sprinkler system layout. The forces developed at the point of connection to the structure must be taken into account and approved by the building structural designer.

Piping installed such that it is supported by laying directly on the building structural members or trapeze shall be secured in place to resist vertical moment as if it were hanging from the same members or trapeze. Exceptions will be allowed on a case by case basis with the concurrence of the Facility Fire Protection Engineer.

Hangers: Layout shall be based upon pressures in excess of 100 psi. Hangers attaching to steel purlins shall be attached by connecting into the web of the purlin using side beam brackets.

Flushing Connections: Flushing connections shall be provided as required.

Sleeves and Penetrations: All pipes penetrating concrete or masonry walls or floors shall be sleeved. Sleeves shall be caulked to retain the proper fire wall rating and to prevent water

entry from outside the building or between floors with an approved sealant. Sleeves shall extend 1 in. above the finished floor.

Sprinklers: Sprinklers heads shall be ½", upright or dry pendent, throughout the building. The office area and door vestibules shall use ½", dry pendent, ordinary temperature heads below the suspended ceiling and high temperature upright, heads above the suspended ceiling. Storage areas and storage buildings shall use high temperature heads and equipment areas shall use intermediate rated temperature heads.

Dry pendent sprinkler heads shall not be installed in any fittings or cuplings that will allow moisture to accumulate above the seal of the sprinkler head.

Estucheons: Two piece estucheons shall be provided on all pendent sprinklers located beneath an intermediate ceiling.

Spare sprinkler heads shall be provided in accordance with NFPA 13. A wall mounted metal cabinet adjacent to the riser shall be provide to contain the sprinkler heads along with a wrench for each type of sprinkler head. The cabinet shall have a hinged cover.

Sprinkler Spacing: Sprinklers spacing shall be based upon the hazard protected, but in no case less required for Ordinary Hazard Group I.

Head Guards: Guards shall be placed around all heads which are subject to mechanical damage.

Control Valves: All valves controlling fire protection water supplies shall be provided with valve supervision capabilities.

Inspector Test Connections: Inspector test connections shall use a ¼ turn ball valve. Test connection valve shall be located at the hydraulically remote end of the system, approximately 6 ft maximum above finished floor. It shall drain to the exterior of the building.

Low Point Drains: Low point drains shall be arranged to allow system drainage without the use of ladder. The drains shall discharge to a safe location, preferably to the exterior of the building, if at all possible. Drain valves shall consist of 1/4 turn ball valves.

Splash Blocks: The Subcontractor shall furnish splash blocks at the main drain, inspector's test connection, and all other exterior discharge locations that do not drain onto asphalt or concrete.

SUBMITTALS:

Layout Requirements: The fire suppression system layout shall be submitted as a complete bound package for review. A complete package shall consist of all working plans, hydraulic calculations, sway bracing calculations, and other vendor data required by this specification. Working plans shall contain all information required by NFPA 13, FM 2-8, 2-8N and include an outline showing all ductwork. Partial submittals will be considered as incomplete and will not be reviewed. The layout must be reviewed and receive an authorization to proceed by the Contractor prior to beginning of installation.

The Subcontractor shall submit all layout drawings for review and authorization to proceed prior to construction. All drawings shall be CAD generated and completed on size D (22 x 34 in.) drawings. Lettering size shall be a minimum of 1/8 (.125)" inch for all lettering on the main body of the drawing. Border and title block shall follow format in this drawing package. An electronic copy in AutoCAD, DWG format, shall be furnished in addition to the original drawing plots. Electronic copies of border and title block format is available upon request. An A/E Drawing Standard format is available upon request.

As-built drawings in both hard copy and electronic shall be submitted. Additionally electronic and hard copy As-built hydraulic calculations, compatible with HASS 7.1 shall be submitted with the drawings.

Quality Control Submittals:

Procedures: The Subcontractor shall submit a hydrostatic test procedure and a detailed, job specific flushing procedure. The flushing procedure shall outline where the flushing water will be obtained and how it will be disposed of in a safe manner. It shall also outline how the flow will be monitored to assure adequate flow and how long the flow must be maintained to adequately flush the piping. This procedure must be submitted for review prior to any connections to existing plant piping.

Certifications: A Contractor's Material and Test Certification for Above-Ground Piping shall be completed and accepted, for each major portion of the work covered by this specification prior to final acceptance of the installation.

Test Reports: A final inspection form shall be submitted for the automatic sprinkler system installed or modified by this project. See Attachment 2 of this section for acceptance forms to be submitted.

Building Manufacture Letter: A letter from the steel building manufacture approving the method, location, and forces used in the attachment of earthquake sway bracing.

See Section 01300, Submittals and the Vendor Data Schedule for additional submittal requirements.

QUALITY CONTROL:

The sprinkler contractor for the fire sprinkler system shall have a NICET Certified Engineering Technician, (CET), in Fire Protection with a minimum Level III rating or a Professional Engineer, (PE), in Fire Protection responsible for overseeing the preparation of the layout drawings and installation. This person shall be required to certify that the drawings are in accordance with the this specification and all referenced regulatory requirements. All drawings shall be signed by the CET or stamped by the PE.

Manufacturers: Firms regularly engaged in the manufacture of fire sprinklers and piping accessories of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 yrs.

Installer: A firm with at least 3 yrs of successful installation experience on projects with fire sprinkler piping similar to that required for this project. The installing Subcontractor shall be licensed by the State of Idaho as a Fire Protection Sprinkler Subcontractor.

UL Listed or FM Approved: Provide sprinkler piping, fittings, and devices with a UL listing and FM approval unless supplying the as specified product.

Exceptions will be made on a case by case bases for products submitted as Or Equals. If no product exists that has both a UL listing and FM Approval, it will be acceptable to use a product that has been published in either organizations publications.

Regulatory Requirements (Codes and Standards): Comply with the provisions of the following codes and standards unless otherwise specified herein.

NATIONAL FIRE PROTECTION ASSOCIATE (NFPA)

NFPA 13 "Standard for the Installation of Sprinkler Systems"

FACTORY MUTUAL (FM)

Approval Guide	Fire Protection
FM data sheet 2-8	"Earthquake Protection for Sprinkler Systems"
FM data sheet 2-8N	"Installation of Sprinkler Systems"

Upon completion of the automatic sprinkler system installation, the individual with the NICET level III or equivalent certification, or the PE responsible for the system layout, shall conduct the final main drain test and verify the installation has been installed in accordance with the working drawings and meets the layout requirements of this specification.

DELIVERY, STORAGE AND HANDLING:

All materials shall be delivered to and stored at the job site in a manner which will prevent foreign material from getting inside the piping and valving.

SEQUENCING /SCHEDULING:

The static and dynamic loads associated with the fire protection system must be coordinated with the building structural design.

The underground fire water main must be flushed and accepted prior to connection to the sprinkler system riser.

DELIVERY, STORAGE AND HANDLING:

All materials shall be delivered to and stored at the job site in a manner which will prevent foreign material from getting inside the piping and valving.

SITE CONDITIONS: This is new construction at the INEEL.

SEQUENCING/SCHEDULING: The static and dynamic loads associated with the fire protection system must be coordinate with the building structural design.

PART 2--PRODUCTS

MATERIALS AND EQUIPMENT:

Sprinkler Piping: Galvanized steel piping shall be welded or seamless, Schedule 40, conforming to the requirements of ASTM A-53 or A-795. Schedule 10 UL listed or FM approved, or ASTM A-795 approved for 2 ½ in. and larger pipe is acceptable in office areas. Welding will not be allowed on galvanized piping unless the weld effect area is hot dip galvanized after welding is completed.

Stainless steel piping shall be seamless 304L, Schedule 40, conforming to the requirements of ASTM A312.

Pipe Fittings:

Reduction in pipe size shall be made with one-piece reducing fittings. Bushings will not be acceptable. Plain-end fittings are not acceptable.

Welded fittings on galvanized piping will not be allowed unless the weld effected zone of the fitting and associated piping is hot dip galvanized.

Stainless steel fittings shall be 304, ASTM 351 in accordance with the requirements set forth in NFPA 13 and FM 2-8N. Reduction in pipe size shall be made with one-piece reducing fittings. Bushings are not acceptable.

Pipe Couplings:

Flexible couplings in pipelines shall be Victualic Style 75, 77, or approved equal. The grooving machine used to prepare the piping to except the flexible couplings shall be approved for use with the coupling by the coupling manufacture.

Rigid couplings in pipelines shall be Victualic Style 005, 07, or approved equal. The grooving machine used to prepare the piping to except the flexible couplings shall be approved for use with the coupling by the coupling manufacture.

Plain end and welded couplings shall not be allowed.

Sprinkler Heads: All heads shall be listed and approved for use in the occupancies described above.

Stainless steel heads shall be Central Model A-2 or approved equal.

Dry type heads shall be Central Model A-1 ADJ or approved equal.

Sprinkler Guards: Shall be of the type that can be installed after the sprinkler head is installed. Guards shall be Gem model F774 or equal.

Spare Sprinkler Heads: The Subcontractor shall furnish spare sprinkler heads in accordance with NFPA 13 and a sprinkler head wrench in the wall-mounted metal cabinet adjacent to the riser. Cabinet shall have a hinged cover. Subcontractor shall provide the spare sprinkler cabinet.

Fire Department Connections: Shall be of the siamese type, 2½ x 2½ x 4 in. and shall have two 2½ in. female swivel connections with National Standard fire hose threads. The fire department connections shall be Potter-Roemer Model 5710 or approved equal. Two 2½ in. plugs shall be included and shall be Potter-Roemer Model 5950 or approved equal. An identification plate labeled "AUTOSPKR" shall be provided.

Control Valve:

Butterfly Valve: A butterfly valve with weather proof actuator housing, have a positive indication for the open and closed position, and be prewired for valve supervision. It shall be Victaulic Series 708-W or approved equal.

Outside Screw and Yoke (OS&Y): Valves shall be UL listed and FM approved. American Flow Control, Series 500 or approved equal.

Electric Bell: The electric bell shall be Potter PBD Series or approved equal with BBK-1 Weatherproof backbox, unless otherwise directed by the cognizant Fire Protection Engineer.

Dry Pipe Valve: The dry pipe valve shall use a positive latching mechanism and be complete with factory supplied trim, including a water motor alarm, water flow alarm switch, and low pressure air switch. The valve shall be UL listed and FM approved. Victaulic Series 756, with proper trim, or approved equal.

Air Maintenance Device: This device shall reduce the pressure of the in coming air supply in order to maintain system air pressure. The air maintenance device shall be by the same manufacture as the dry pipe valve.

Air Compressor: The air compressor shall be a riser mounted system. Viking model E-1 Maintenance Air Compressor or approved equal.

Air Dryer: Air dryers shall be the inline desiccant type designed to provide a dew point of at least -20° F. A coalescing type prefilter shall be provided with the air dryers.

Concrete Block Anchors:

Grout-filled: Anchors shall be a rated for ASTM C90, concrete block, filled with 2000 psi grout conforming to ASTM C474. Hilti model HIT HY 150 Injection Adhesive Anchor or HVA Adhesive System.

Hollow Block: Anchors shall be approved for use in ASTM C90, type II, hollow concrete block. Hilti model Sleeve Anchor or approved equal.

Pipe Stands: Pipe stands shall be adjustable and have a pipe saddle. Tolco Fig. 319 with Fig. 317 saddle or approved equal

Check Valves:

Swing Check: Swing check valves shall have a removable faceplate to allow for maintenance of the valve without the need of removing it from the system. Viking model G-1 or approved equal.

Wafer Check: Wafer check valves shall contain an o-ring sealed clapper, torsion spring loaded, and be of the butterfly valve type. Grinnell, Model F512 or approved equal.

Water Flow Pressure Alarm Switch: Pressure type water flow alarm switch with built in recycling pneumatic retard and two sets of SPDT contacts shall be provided as part of the Alarm Valve trim. Potter-PS10-2 Pressure Type Flow Switch or approved equal.

Hangers:

Threaded side beam brackets, TOLCO Fig. 58 or approved equal with bolt and hex nut fastener.

C-Type beam clamps with retaining strap, TOLCO Fig. 65, 66, or approved equal. Retaining strap TOLCO Fig. 69 or approved equal.

Ring Hanger, TOLCO Fig. 2, 2NFPA, and 200 or approved equal.

Surge Restrainer: TOLCO Fig. 25 or approved equal.

Straps: Straps shall be UL Listed and FM approved, ¼" bolt holes, Carbon Steel. Grinnell Short Strap, Fig. 262 or approved equal.

Concrete Anchors: Anchors shall be Factory Mutual Approved for use in Pre-Cast Hollow Core, Post Tensioned, and Poured Concrete. Hilti Model HDI-P or approved equal.

Earthquake and Sway Bracing: Bracing shall be UL listed or designed by a registered Professional Engineer in the State of Idaho. TOLCO or approved equal.

Inspector Test Connections: Inspector test connections shall use a 1/4 turn ball valve. The test connection valve shall be located at the hydraulically remote end of the system, approximately 6 ft maximum above finished floor and drain to the exterior of the building.

Signs: All drain and test valves shall have identification signs per NFPA 13. Lettering shall be a minimum of ½ in. high white letters on red background.

Hydraulic Data Placards: Hydraulic data placards shall be metal and permanently embossed with the information required by NFPA 13. Subcontractor shall supply, fill in all the required information, and install the placards on the system riser.

Splash Block: Splash blocks shall be constructed of concrete.

Air Compressor: Air compressor shall meet the requirements of NFPA 13, 3-2.6.6.

Air Maintenance Device: Air maintenance device shall be UL listed or FM approved. Central Model DA or approved equal.

Low Air Pressure Switch: Provide as a part of the dry pipe valve trim a low air pressure switch with two (2) sets of SPDT contacts. Pressure switch shall be Potter PS40-2 or approved equal.

PAINTING AND IDENTIFICATION OF PIPING

See Section 09900 Painting, for the requirements of painting and labeling all pipe, fittings, hangers, and devices. Galvanized piping need not be painted but shall be labeled.

PART 3--EXECUTION

FIELD QUALITY CONTROL:

Installation: Only new and approved sprinklers, piping, fittings, hangers, and devices shall be employed in the installation of the sprinkler system.

One set of approved fire protection layout drawings shall be maintained on the project site during construction. The Subcontractor shall redline all changes daily. The redline drawings shall be incorporated on the "as-built" layout drawings by the Subcontractor.

Stainless steel screwed fittings shall utilize TEFLON tape and/or TEFLON paste to prevent galling.

Acceptance Tests:

Flushing of Piping: New underground mains and lead-in connections to system risers shall be flushed thoroughly immediately after tie-in to system is made or before connection is made to the sprinkler piping.

Test of Dry Pipe System Piping: All new fire system piping shall be hydrostatically tested at not less than 225 psi pressure for two (2) hours with no visible leakage. All leaks shall be repaired and system retested.

Dry System Air Test: In addition to the standard hydrostatic test, an air pressure leakage test at 40 psi shall be conducted for 24 hours. Any leakage that results in a loss of pressure in excess of 1½ psi for the 24 hours shall be corrected.

Existing fire sprinkler systems requiring minor modifications and connections to existing systems shall be tested at the normal system working pressure for not less than twenty four (24) hours and inspected with no visible leakage. Any leaks detected shall be repaired and re-tested.

Compressor Test: Verify the air compressor starts and stops at the correct air pressures for the dry pipe valve selected. Pressures must not exceed the maximum pressure or go below the minimum pressure as recommended by the dry pipe valve manufacture.

CLEANING:

Flushing of Piping: New underground mains and lead-in connections to system risers shall be flushed thoroughly immediately after tie-in to system is made or before connection is made to the sprinkler piping.

Sprinkler Pipe Flushing Procedure: Upon completion of installation, the system shall be filled and drained at least two (2) times. Water shall be run through the inspectors test connection or auxiliary drain until water flows clear.

Sprinkler Pipe Flushing Procedure: Upon completion of installation, the system shall be filled and drained at least two (2) times. Water shall be run through the inspectors test connection or auxiliary drain until water flows clear. Testing and flushing shall be witnessed by the Contractor's Representative. System shall be left in a drained condition.

Surveillance will be performed by the Contractor's Representative to verify compliance of the work to the drawings and specifications.

END OF SECTION 13911

Attachment 1

Contractor's Material & Test Certificate

CONTRACTOR'S MATERIAL AND TEST CERTIFICATE FOR ABOVEGROUND PIPING

PROCEDURE

Upon completion of work, inspection and tests shall be made by the contractor's representative and witnessed by an owner's representative. All defects shall be corrected and system left in service before contractor's personnel finally leave the job.

A ate shall be filled out and signed by both representatives. Copies shall be prepared for approving authorities, owners, and contractor. It is understood th .'s representative's signature in no way prejudices any claim against contractor for faulty material, poor workmanship, or failure to comply with approving authority's requirements or local ordinances.

Property Name	**Date**

Property Address

PLANS	Accepted by approving authorities (names)	
	Address	
	Installation conforms to accepted plans Equipment used is approved. If no, explain deviation	Γ YES Γ NO Γ YES Γ NO
INSTRUCTIONS	Has person in charge of fire equipment been instructed as to location of control valves and care and maintenance of this new equipment? If no, explain	Γ YES Γ NO
	Have copies of the following been left on the premises: 1. System Components Instructions 2. Care and Maintenance Instructions 3. NFPA 25	 Γ YES Γ NO Γ YES Γ NO Γ YES Γ NO
LOCATION OF SYSTEM	Supplies Buildings	

SPRINKLERS	Make	Model	Year of Manufacture	Orifice Size	Quantity	Temperature Rating

A E AND FITTINGS	Type of Pipe Type of Fittings

ALARM VALVE OR FLOW INDICATOR	Alarm Device			Maximum Time to Operate Through Test Connection	
	Type	Make	Model	Minutes	Seconds

DRY PIPE OPERATING TEST	Dry Valve			Q.O.D.		
	Make	Model	Serial No.	Make	Model	Serial No.

	Time to Trip Thru Test Connection*		Water Pressure	Air Pressure	Trip Point Air Pressure	Time Water Reached Test Outlet*		Alarm Operated Properly	
	Min	Sec	psi	psi	psi	Min	Sec	Yes	No
Without Q.O.D.									
With Q.O.D.									

If no, explain

DELUGE & PREACTION VALVES		
Operation	Γ Pneumatic Γ Electric Γ Hydraulic	
Piping Supervised Γ YES Γ NO		Detecting media supervised Γ YES Γ NO
Does valve operate from the manual trip and/or remote control stations Γ YES Γ NO		

*Measured from thime inspector's test connection is opened.

DELUGE & PREACTION) VALVES (continued	Is there an accessible facility in each circuit for testing Γ YES Γ NO				If no, explain			
	Make	Model	Does Each Circuit Operate Supervision Loss Alarm		Does Each Circuit Operate Valve Release		Maximum Time to Operate Release	
			Yes	No	Yes	No	Min	Sec
PRESSURE REDUCING VALVE TEST	Location & Floor	Make & Model	Setting	Static Pressure		Residual Pressure (Flowing)		Flow Rate
				Inlet (PSI)	Outlet (PSI)	Inlet (PSI)	Outlet (PSI)	Flow (GPM)
TEST DESCRIPTION	Hydrostatic: Hydrostatic test shall be made at not less than 200 psi (13.6 bars) for two hours or 50 psi (3.4 bars) above static pressure in excess of 150 psi (10.2 bars) for two hours. Differential dry-pipe valve clappers shall be left open during test to prevent damage. All aboveground piping leakage shall be stopped.							
	Pneumatic: Establish 40 psi (2.7 bars) air pressure and measure drop which shall not exceed 1-1/2 psi (0.1 bars) in 24 hours. Test pressure tanks at normal water level and air pressure and measure air pressure drop which shall not exceed 1-½ psi (0.1 bars) in 24 hours.							
TESTS	All piping hydrostatically tested at ___ psi for ___ hrs. Dry piping pneumatically tested Γ YES Γ NO Equipment operates properly Γ YES Γ NO				If no, state reason			
	Do you certify as the Sprinkler Contractor that additives and corrosive chemicals, sodium silicate or derivatives of sodium silicate, brine, or other corrosive chemicals were not used for testing systems or stopping leaks? Γ YES Γ NO							
	Drain Test	Reading of gage located near water supply test connection: ___ psi			Residual pressure with valve in test connection open wide ___ psi.			
	Underground mains and lead in connections to system risers flushed before connection made to sprinkler piping. Verified by copy of the U Form No. 85B Γ YES Γ NO Other Explain Flushed by installer of underground sprinkler piping Γ YES Γ NO							
	If powder driven fasteners are used in concrete, has representative sample testing been satisfactorily completed Γ YES Γ NO						If no, explain	
BLANK TESTING GASKETS	Number Used		Locations				Number Removed	
WELDING	Welded Piping Γ YES Γ NO If Yes...							
	Do you certify as the Sprinkler Contractor that welding procedures comply with the requirements of at least AWS D10.9, Level AR-3						Γ YES	Γ NO
	Do you certify that the welding as performed by welders qualified in compliance with the requirements of at least AWS D10.9, Level AR-3						Γ YES	Γ NO
	Do you certify that welding was carried out in compliance with a documented quality control procedure to ensure that all discs are retrieved, that openings in piping are smooth, that slag and other welding residue are removed, and that the internal diameters of piping are not penetrated						Γ YES	Γ NO
CUTOUTS (DISCS)	Do you certify that you have a control feature to ensure that all cutouts (discs) are retrieved? Γ YES Γ NO							
HYDRAULIC DATA NAMEPLATE	Name Plate Provided Γ YES Γ NO				If no, explain			
REMARKS	Date left in service with all control valves open:							
SIGNATURES	Name of Sprinkler contractor							
	Tests Witnessed By							
	For Property Owner (Signed)		Title				Date	
	For Sprinkler Contractor (Signed)		Title				Date	

Additional Explanation and Notes

Attachment 2

FINAL INSPECTION FORM

INEEL FIRE PROTECTION INSTALLATION
FINAL INSPECTION FORM

Sprinkler Contractor name and address	_____ _____ _____
Facility Inspected Building/System No./ Control Valve No.	_____ _____ _____
Inspection by: Name address phone	_____ _____ _____ _____ _____ PE or CET No _____

I have personally inspected the automatic sprinkler system referenced above and found it to be installed in accordance with the approved working drawings and associated review comments. The attached As-Built drawings and hydraulic calculations reflect the installation as it presently exists.

The following is the results of the main drain test conducted during my inspection:

Static Pressure: _____ Psig
Residual Pressure: _____ Psig

I certify that all areas of the building covered by the above referenced system have been protected in accordance with NFPA, Factory Mutual, and the project specifications, and all signs and placards have been installed.

_____ Date: _____
(Signed by PE or CET)

Comments or Exceptions: _____
_____
_____
_____
_____
_____
_____
_____
_____

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